
Clock Controller operation

This chapter describes basic principles of clock operation, with a discussion of operating modes, error handling, and recovery principles.

Clock operation

Vintages A through F have two types of clock operation: tracking mode and free run mode. Vintages G and H have three possible modes: tracking, free run, and holdover.

Tracking mode

LD 73 defines the digital loop (or loops) supplying an external clock reference to a Clock Controller. If two loops are defined, one is the primary reference source for clock synchronization, the other a secondary reference source that backs up the primary reference.

A dual-CPU system can have two Clock Controllers (CC0 and CC1), a primary and a backup. Each is completely locked to the reference clock as shown in [Figure 4](#).

Free run (nontracking) mode

The clock synchronization for a digital loop can operate in free run mode if

- no loop is defined as a primary clock reference
- the primary and secondary references are disabled
- the primary and secondary references are in red (local) alarm

Holdover mode

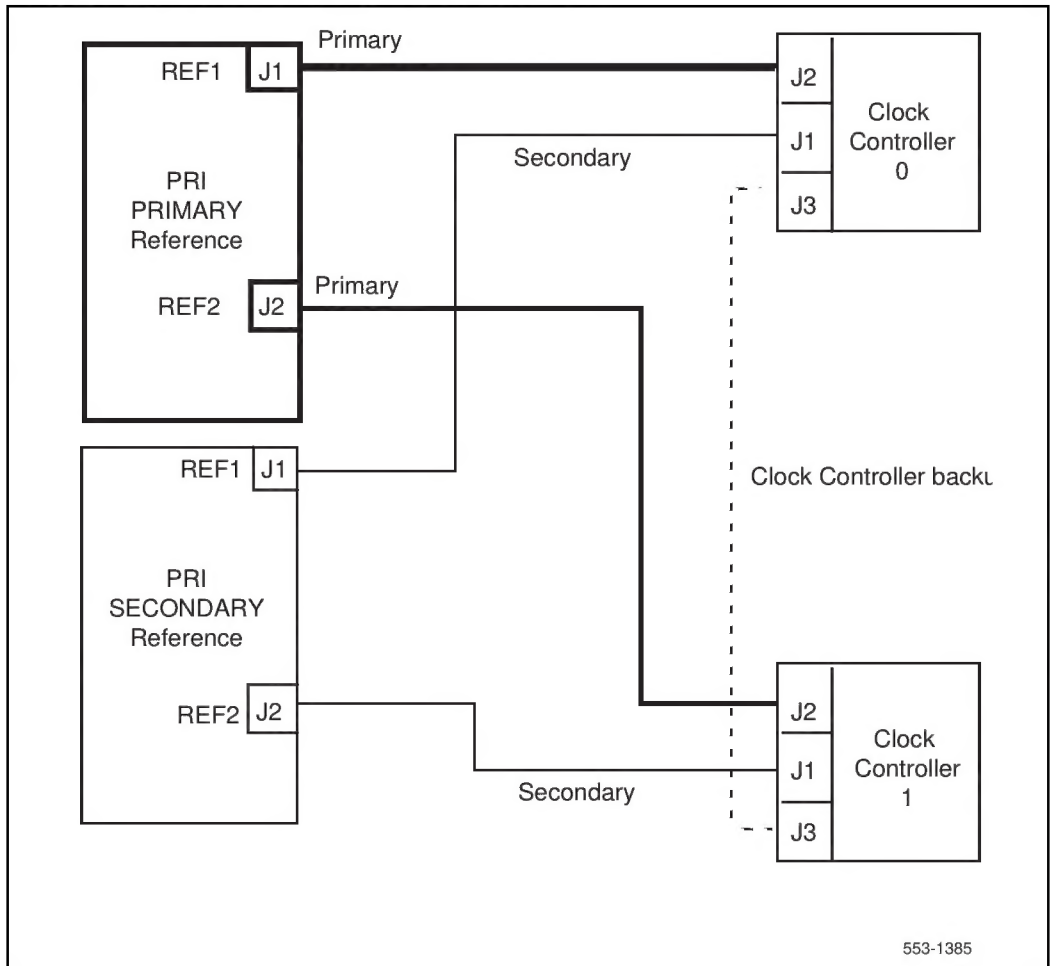
Vintages G and H provide a holdover mode that retains references in case of system failure. Holdover mode remembers the last Clock Controller position and restores references upon system restart to maximize synchronization accuracy.

Reference clock errors

The Meridian 1 auditing software checks every 15 minutes to see if a Clock Controller or reference clock error has occurred. Reference clock errors typically result from problems with the clock driver or with the reference system clock at the far end.

In tracking mode, one active Clock Controller tracks a single reference clock. If a Clock Controller error is detected on dual-CPU systems, the system switches to the backup Clock Controller. **Figure 4** illustrates the primary and secondary tracking functions.

Figure 4
Clock Controller primary and secondary tracking



Automatic clock recovery

A red (local) alarm disables a loop. After loop recovery, the loop restarts and automatic clock recovery restarts the clocking devices.

- If the loop is assigned as the primary reference clock but the Clock Controller is tracking on the secondary reference or in free run mode, it is restored to tracking on primary.
- If the loop is assigned as the secondary reference clock but the Clock Controller is in free run mode, it is restored to tracking on secondary.
- If the 15-minute clock check indicates the system is in free run mode, the primary reference clock, if defined, resumes tracking.
- If the primary reference is disabled or in red (local) alarm, the secondary reference clock, if defined, assumes the tracking responsibilities.

A system deliberately set to free run resumes tracking on a reference clock at this time unless the clock-switching option has been disabled (LD 60, command MREF) or the reference clock is undefined in the database.

In X11 release 14, the EREF command in LD 60 enables the automatic recovery after LD 70 has been used to set AUTO=YES. With X11 release 15 and later, set AUTO=YES in LD 73; the EREF command is not required.

Automatic clock switching

Automatic changes in tracking may occur when clock recovery is enabled. Normally, the primary reference clock resumes tracking. If the assigned primary reference clock is not available, the secondary reference clock assumes tracking responsibilities. If the secondary reference clock cannot provide tracking, the system switches to free run.